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EXAMINER	
RAO, ANAND SHASHIKANT	
ART UNIT	PAPER NUMBER
2621	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	01/31/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/815,489	KALTENBACHER ET AL.	
	Examiner	Art Unit	
	Andy S. Rao	2621	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-46* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-46* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *9/15/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The specification has not been checked to the extent necessary to determine the presence of all possible minor errors. Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1-5, 9-12, 17-21, 30, 33-36, and 41-42 are rejected under 35 U.S.C. 102(b) as being anticipated by Heckman et al., (hereinafter referred to as "Heckman").

Heckman discloses a 3-D imaging system adapted for remote information acquisition (Heckman: figure 8) comprising: a platform for supporting and conveying the imaging system (Heckman: column 6, lines 8-10); an illumination source affixed to the platform which is adapted to transmit light to a subject surface (Heckman: column 5, lines 43-47); a light detector affixed to the platform adapted to collect the light reflected back from the subject surface (Heckman: column 5, lines 50-53); and a data processing system in communication with the light detector for compiling data obtained from the reflected light to produce an image therefrom by using algorithm (Heckman: column 3, lines 20-30): $R = S \bullet \tan(\phi + [row\# \bullet F.O.V./total\ rows])$, where R is distance between the illumination source and the subject surface, S is equal to a distance

between the source and the detector (Heckman: column 4, lines 1-55), row# is equal to a current row where line is detected, total rows is equal to a total number of vertical imaging elements, F.O.V. is equal to a field of view as seen by the light receiver in relation to the subject surface, and phi is equal to a vertical angle between a plane of light created by the illumination source and the center of the field of view of the detector (Heckman: figure 9), as in claim 1.

Regarding claim 2, Heckman discloses wherein the platform is selected from the group consisting of AUV's and ROV's (Heckman: column 1, lines 25-32; column 3, lines 20-25), as in the claim.

Regarding claim 3, Heckman discloses wherein the data processing system can further detect a change in wavelength of the light received from the subject source (Heckman: column 5, lines 65-68; column 6, lines 1-7), as in the claim.

Regarding claims 4-5, Heckman discloses wherein the illumination source is a laser in planar geometry (Heckman: column 4, lines 40-50), as in the claims.

Regarding claim 9, Heckman discloses wherein the subject surface is selected from the group consisting of a sea floor, objects resting on the sea floor, tethered objects, ship's hulls, seawalls, and floating objects (Heckman; column 6, lines 10-15; column 1, lines 25-31), as n the claim.

Regarding claim 10, Heckman discloses wherein the imaging system further includes a navigational sensor system (Heckman: column 1, lines 29-31), as in the claim.

Regarding claim 11, Heckman discloses wherein the data processing system is attached to the platform (Heckman: column 6, lines 8-10), as in the claim.

Regarding claim 12, Heckman discloses wherein the imaging system further includes a video screen in a remote location in communication with the data processing system for displaying the image (Heckman: column 3, lines 20-25), as in the claim.

Heckman discloses system adapted for remote information acquisition (Heckman: figure 8), comprising: a platform for supporting and conveying the imaging system (Heckman: column 6, lines 8-10); an illumination source affixed to the platform which is adapted to transmit light having a planar geometry to a subject surface (Heckman: column 5, lines 43-47); a light detector affixed to the platform which is adapted to collect light reflected from the subject surface (Heckman: column 5, lines 50-53); and d. a data processing system in communication with the light detector for compiling data obtained from the reflected light to produce an image therefrom (Heckman: column 3, lines 20-30), as in claim 17.

Regarding claim 18, Heckman discloses wherein the platform is selected from the group consisting of AUV's and ROV's (Heckman: column 1, lines 25-32; column 3, lines 20-25), as in the claim.

Regarding claim 19, Heckman discloses wherein the data processing system detects the distance between the platform and the subject surface (Heckman: column 4, lines 10-20), as in the claim.

Regarding claim 20, Heckman discloses wherein the data processing system can further detect a change in wavelength of the light received from the subject source (Heckman: column 5, lines 65-68; column 6, lines 1-7), as in the claim.

Regarding claim 21, Heckman discloses wherein the illumination source is a laser in planar geometry (Heckman: column 4, lines 40-50), as in the claim.

Regarding claim 25, Heckman discloses wherein the subject surface is selected from the group consisting of a sea floor, objects resting on the sea floor, tethered objects, ship's hulls, seawalls, and floating objects (Heckman; column 6, lines 10-15; column 1, lines 25-31), as n the claim.

Regarding claim 26, Heckman discloses wherein the imaging system further includes a navigational sensor system (Heckman: column 1, lines 29-31), as in the claim.

Regarding claim 27, Heckman discloses wherein the data processing system is attached to the platform (Heckman: column 6, lines 8-10), as in the claim.

Regarding claim 28, Heckman discloses wherein the imaging system further includes a video screen in a remote location in communication with the data processing system for displaying the image (Heckman: column 3, lines 20-25), as in the claim.

Heckman discloses a method of obtaining 3-D images from a remote location (Heckman: column 3, lines 44-51)) comprising: illuminating a subject surface (Heckman: column 5, lines 43-47); deflecting reflection off of the subject surface (Heckman: column 5, lines 50-53); and processing data from the reflection in an algorithm for the production of an image therefrom (Heckman: column 3, lines 20-30): $R = S \cdot \tan(\phi + [row\# \cdot F.O.V./total\ rows])$, where R is distance between the illumination source and the subject surface, S is equal to a distance between the source and the detector (Heckman: column 4, lines 1-55), row# is equal to a current row where line is detected, total rows is equal to a total number of vertical imaging elements, F.O.V. is equal to a field of view as seen by the light receiver in relation to the subject surface, and phi is equal to a vertical angle between a plane of light created by the illumination source and the center of the field of view of the detector (Heckman: figure 9), as in claim 33.

Regarding claim 34, Heckman discloses wherein the imaging method comprises producing an image on a remote video monitor from the processed data (Heckman: column 3, lines 20-25), as in the claim.

Regarding claim 35, Heckman discloses wherein the method is performed on a platform selected from the group consisting of AUV's and ROV's (Heckman: column 1, lines 25-32; column 3, lines 20-25), as in the claim.

Regarding claim 36, Heckman discloses wherein the illumination source is a laser in planar geometry (Heckman: column 4, lines 40-50), as in the claims.

Regarding claim 41, Heckman discloses wherein the data processing step occurs at a remote location from the illuminating and detecting steps (Heckman: column 3, lines 15-30), as in the claim.

Regarding claim 42, Heckman discloses wherein the subject surface is selected from the group consisting of a sea floor, objects resting on the sea floor, tethered objects, ship's hulls, seawalls, and floating objects (Heckman; column 6, lines 10-15; column 1, lines 25-31), as n the claim.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 6-8, 22-24, and 37-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heckman et al., (hereafter referred to as "Heckman") in view of Cabib et al., (hereinafter referred to as "Cabib").

Heckman discloses a 3-D imaging system adapted for remote information acquisition (Heckman: figure 8) comprising: a platform for supporting and conveying the imaging system (Heckman: column 6, lines 8-10); an illumination source affixed to the platform which is adapted to transmit light to a subject surface (Heckman: column 5, lines 43-47); a light detector affixed to the platform adapted to collect the light reflected back from the subject surface (Heckman: column 5, lines 50-53); and a data processing system in communication with the light detector for compiling data obtained from the reflected light to produce an image therefrom by using algorithm (Heckman: column 3, lines 20-30): $R = S \cdot \tan(\phi + [row\# \cdot F.O.V./total\ rows])$, where R is distance between the illumination source and the subject surface, S is equal to a distance between the source and the detector (Heckman: column 4, lines 1-55), row# is equal to a current row where line is detected, total rows is equal to a total number of vertical imaging elements, F.O.V. is equal to a field of view as seen by the light receiver in relation to the subject surface, and phi is equal to a vertical angle between a plane of light created by the illumination source and the center of the field of view of the detector (Heckman: figure 9), wherein the illumination source is a laser (Heckman: column 5, lines 44-46), as in claims 6-8. However, Heckman fails to disclose wherein the laser specifies using a laser with a range of wavelengths from 400nm to 630nm, 450nm to 600nm, and 500nm to 575nm, as in the claims. Cabib discloses that for laser imaging, it is known to use such wavelengths (Cabib: column 20, lines 30-45) for spectral bio-imaging using green to red fluorescence of or water-based organisms such as algae (Cabib:

column 41, lines 10-20 &45-55) in order to gauges a time-frame reference of their presence (Cabib: column 40, lines 40-67). Accordingly, given this teaching it would have been obvious for one of ordinary skill in the art to incorporate Cabib's teaching of using the specific wavelengths for spectral bio-imaging using green to red fluorescence of water-based organisms such as algae into the Heckman apparatus, in order to allow the Heckman apparatus not only provide underwater imagery as originally intended, but also supplement such imagery with organic indication of a time reference to the viewer. The Heckman system, now incorporating Cabib's teaching of using the specific wavelengths for spectral bio-imaging using green to red fluorescence, has all of the features of claims 6-8.

Heckman discloses system adapted for remote information acquisition (Heckman: figure 8), comprising: a platform for supporting and conveying the imaging system (Heckman: column 6, lines 8-10); an illumination source affixed to the platform which is adapted to transmit light having a planar geometry to a subject surface (Heckman: column 5, lines 43-47); a light detector affixed to the platform which is adapted to collect light reflected from the subject surface (Heckman: column 5, lines 50-53); and d. a data processing system in communication with the light detector for compiling data obtained from the reflected light to produce an image therefrom (Heckman: column 3, lines 20-30), as in claims 22-24. However, Heckman fails to disclose wherein the laser specifies using a laser with a range of wavelengths from 400nm to 630nm, 450nm to 600nm, and 500nm to 575nm, as in the claims. Cabib discloses that for laser imaging, it is known to use such wavelengths (Cabib: column 20, lines 30-45) for spectral bio-imaging using green to red fluorescence of or water-based organisms such as algae (Cabib: column 41, lines 10-20 &45-55) in order to gauges a time-frame reference of their presence (Cabib: column

40, lines 40-67). Accordingly, given this teaching it would have been obvious for one of ordinary skill in the art to incorporate Cabib's teaching of using the specific wavelengths for spectral bio-imaging using green to red fluorescence of water-based organisms such as algae into the Heckman apparatus, in order to allow the Heckman apparatus not only provide underwater imagery as originally intended, but also supplement such imagery with organic indication of a time reference to the viewer. The Heckman system, now incorporating Cabib's teaching of using the specific wavelengths for spectral bio-imaging using green to red fluorescence, has all of the features of claims 22-24.

Heckman discloses a method of obtaining 3-D images from a remote location (Heckman: column 3, lines 44-51)) comprising: illuminating a subject surface (Heckman: column 5, lines 43-47); deflecting reflection off of the subject surface (Heckman: column 5, lines 50-53); and processing data from the reflection in an algorithm for the production of an image therefrom (Heckman: column 3, lines 20-30): $R = S \cdot \tan(\phi + [row\# \cdot F.O.V./total\ rows])$, where R is distance between the illumination source and the subject surface, S is equal to a distance between the source and the detector (Heckman: column 4, lines 1-55), row# is equal to a current row where line is detected, total rows is equal to a total number of vertical imaging elements, F.O.V. is equal to a field of view as seen by the light receiver in relation to the subject surface, and phi is equal to a vertical angle between a plane of light created by the illumination source and the center of the field of view of the detector (Heckman: figure 9), as in claims 37-39. However, Heckman fails to disclose wherein the laser specifies using a laser with a range of wavelengths from 400nm to 630nm, 450nm to 600nm, and 500nm to 575nm, as in the claims. Cabib discloses that for laser imaging, it is known to use such wavelengths (Cabib: column 20, lines 30-45) for

spectral bio-imaging using green to red fluorescence of or water-based organisms such as algae (Cabib: column 41, lines 10-20 &45-55) in order to gauges a time-frame reference of their presence (Cabib: column 40, lines 40-67). Accordingly, given this teaching it would have been obvious for one of ordinary skill in the art to incorporate Cabib's teaching of using the specific wavelengths for spectral bio-imaging using green to red fluorescence of water-based organisms such as algae into the Heckman method, in order to allow the Heckman method not only provide underwater imagery as originally intended, but also supplement such imagery with organic indication of a time reference to the viewer. The Heckman method, now incorporating Cabib's teaching of using the specific wavelengths for spectral bio-imaging using green to red fluorescence, has all of the features of claims 37-39.

6. Claims 13-16, 29-32 and 43-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Heckman et al., (hereafter referred to as "Heckman").

Heckman discloses a 3-D imaging system adapted for remote information acquisition (Heckman: figure 8) comprising: a platform for supporting and conveying the imaging system (Heckman: column 6, lines 8-10); an illumination source affixed to the platform which is adapted to transmit light to a subject surface (Heckman: column 5, lines 43-47); a light detector affixed to the platform adapted to collect the light reflected back from the subject surface (Heckman: column 5, lines 50-53); and a data processing system in communication with the light detector for compiling data obtained from the reflected light to produce an image therefrom by using algorithm (Heckman: column 3, lines 20-30): $R = S \cdot \tan(\phi + [row\# \cdot F.O.V./total\ rows])$, where R is distance between the illumination source and the subject surface, S is equal to a distance between the source and the detector (Heckman: column 4, lines 1-55), row# is equal to a current

row where line is detected, total rows is equal to a total number of vertical imaging elements, F.O.V. is equal to a field of view as seen by the light receiver in relation to the subject surface, and phi is equal to a vertical angle between a plane of light created by the illumination source and the center of the field of view of the detector (Heckman: figure 9), as in claims 13-16. However, Heckman fails to disclose that the 3-D imaging system has a second data processing system, a second detector, and a second light source as in the claims. But the Examiner notes that these additional limitations represent a mere duplication of the elements as in claim 1, and as such are unpatentable as has been long established by the courts, *St. Regis Paper Co. v. Bemis Co., Inc., 193 USPQ 8, 11, (7th Cir. 1977).* In this case, given the Heckman reference, it would have been obvious for one of ordinary skill in the art to duplicate elements of the Heckman reference by adding a second data processing system, second light source, and a second detector in order to increase the imaging area of the 3-D system over the one that was originally disclosed. The Heckman system, now with the duplicated elements of a second data processing system, second light source, and second detector, has all of the features of claims 13-16.

Heckman discloses system adapted for remote information acquisition (Heckman: figure 8), comprising: a platform for supporting and conveying the imaging system (Heckman: column 6, lines 8-10); an illumination source affixed to the platform which is adapted to transmit light having a planar geometry to a subject surface (Heckman: column 5, lines 43-47); a light detector affixed to the platform which is adapted to collect light reflected from the subject surface (Heckman: column 5, lines 50-53); and a data processing system in communication with the light detector for compiling data obtained from the reflected light to produce an image therefrom (Heckman: column 3, lines 20-30), as in claims 29-32. However, Heckman fails to disclose that

the 3-D imaging system has a second data processing system, a second detector, and a second light source as in the claims. But the Examiner notes that these additional limitations represent a mere duplication of the elements as in claim 17, and as such are unpatentable as has been long established by the courts, St. Regis Paper Co. v. Bemis Co., Inc., *193 USPQ 8, 11, (7th Cir. 1977).* In this case, given the Heckman reference, it would have been obvious for one of ordinary skill in the art to duplicate elements of the Heckman reference by adding a second data processing system, second light source, and a second detector in order to increase the imaging area of the 3-D system over the one that was originally disclosed. The Heckman system, now with the duplicated elements of a second data processing system, second light source, and second detector, has all of the features of claims 29-32.

Heckman discloses a method of obtaining 3-D images from a remote location (Heckman: column 3, lines 44-51)) comprising: illuminating a subject surface (Heckman: column 5, lines 43-47); deflecting reflection off of the subject surface (Heckman: column 5, lines 50-53); and processing data from the reflection in an algorithm for the production of an image therefrom (Heckman: column 3, lines 20-30): $R = S \bullet \tan(\phi + [row\# \bullet F.O.V./total\ rows])$, where R is distance between the illumination source and the subject surface, S is equal to a distance between the source and the detector (Heckman: column 4, lines 1-55), row# is equal to a current row where line is detected, total rows is equal to a total number of vertical imaging elements, F.O.V. is equal to a field of view as seen by the light receiver in relation to the subject surface, and phi is equal to a vertical angle between a plane of light created by the illumination source and the center of the field of view of the detector (Heckman: figure 9), as in claims 43-46. However, Heckman fails to disclose that the 3-D imaging system has a plurality of data processing means,

a plurality of detectors, and a second illumination source as in the claims. But the Examiner notes that these additional limitations represent a mere duplication of the elements as in claim 33, and as such are unpatentable as has been long established by the courts, *St. Regis Paper Co. v. Bemis Co., Inc., 193 USPQ 8, 11, (7th Cir. 1977).* In this case, given the Heckman reference, it would have been obvious for one of ordinary skill in the art to duplicate elements of the Heckman reference by adding a plurality of data processing means, a plurality of detectors, and a second illumination source, in order to increase the imaging area of the 3-D method over the one that was originally disclosed. The Heckman method, now with the duplicated elements of a plurality of data processing means, a plurality of detectors, and a second light source has all of the features of claims 43-46.

7. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Heckman et al., (hereafter referred to as "Heckman") in view of Ulich et al, (hereinafter referred to as "Ulich").

Heckman discloses a method of obtaining 3-D images from a remote location (Heckman: column 3, lines 44-51)) comprising: illuminating a subject surface (Heckman: column 5, lines 43-47); deflecting reflection off of the subject surface (Heckman: column 5, lines 50-53); and processing data from the reflection in an algorithm for the production of an image therefrom (Heckman: column 3, lines 20-30): $R = S \cdot \tan(\phi + [row\# \cdot F.O.V./total\ rows])$, where R is distance between the illumination source and the subject surface, S is equal to a distance between the source and the detector (Heckman: column 4, lines 1-55), row# is equal to a current row where line is detected, total rows is equal to a total number of vertical imaging elements, F.O.V. is equal to a field of view as seen by the light receiver in relation to the subject surface, and phi is equal to a vertical angle between a plane of light created by the illumination source and the

center of the field of view of the detector (Heckman: figure 9), as in claim 40. However, Heckman fails to disclose wherein the laser specifies using a laser with a range of wavelengths including ultraviolet and infrared wavelengths, as in the claims. Ulich discloses that for a lidar imaging method, it is known to use ultraviolet and infrared laser wavelengths in order to pick up ocean features that are invisible in visible light (Ulich: column 5, lines 20-60). Accordingly, given this teaching, it would have been obvious for one of ordinary skill in the art to incorporate the use of non-visible wavelengths such as ultraviolet and infrared into the Heckman method in order to more detailed images of the ocean sub-surface. The Heckman method, now incorporating the use of UV and IR lasers, has all of the features of claim 40.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Bowker discloses underwater imaging in real-time. Eppel discloses a depth mapping system. Caimi discloses a three dimensional mapping system and method.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andy S. Rao whose telephone number is (571)-272-7337. The examiner can normally be reached on Monday-Friday 8 hours.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mehrdad Dastouri can be reached on (571)-272-7418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Andy S. Rao
Primary Examiner
Art Unit 2621

asr
January 26, 2007